

Question Paper

Security Analysis – I : October 2001

Part A : Basic Concepts (30 Points)

- This part consists of questions with serial number 1 - 30.
- Answer **all** questions.
- Each question carries one point.
- Maximum time for answering Part A is 30 Minutes.

1. The P/E ratio of a stock is 12. The expected dividend from the stock is Rs.2.00 per share with an EPS of Rs.10. The expected return for holding the stock for 1 year if it was bought for Rs.90 per share is
 - a. 35.56%
 - b. 40.26%
 - c. 43.86%
 - d. 44.23%
 - e. 44.86%
2. The number of unique covariance terms required to be calculated in order to calculate the risk of portfolio of 11 securities by the Markowitz model is
 - a. 25
 - b. 35
 - c. 37
 - d. 42
 - e. 55
3. Which of the following statements is/are **true** of “market extraction method” to derive the capitalization rate of real assets?
 - I. In this method, net operating income is divided by sales price to get the capitalization rate
 - II. In this method, the rates on equity as well as debt financing rates are weighted according to their proportions to calculate the capitalization rate.
 - III. In this method, the capitalization rate is the sum of the return required on an asset for its being non-liquid, and the risk free rate
 - IV. In this method, comparable property is selected to choose a rate which reflects market sentiments.
 - a. Only (I) above
 - b. Only (II) above
 - c. Only (III) above
 - d. Only (IV) above
 - e. Both (I) and (IV) above.
4. Which of the following statements is **true** of an option?
 - a. A call option is a right to sell without an obligation to do so
 - b. A put option is a right to buy without an obligation to do so
 - c. Call option on a stock will give a linear risk-return payoff
 - d. Put option is a right to sell without an obligation to do so
 - e. Put option on a stock will give a linear risk-return payoff.

5. Which of the following principles is **true** while analyzing trend line penetrations?
- The lesser the number of peaks/troughs that touch a trendline, the greater its significance
 - The breadth of a trendline indicates whether a penetration is significant or not
 - A steep trendline is easily violated by small sideward movements in the price chart, and is not particularly useful in identifying reversals.
 - Penetration of a steep trendline results in a corrective movement after which the new trend starts.
 - When the peaks of rallies penetrate the trend line and then return, the recurrence of this tendency indicates that the trend “obeys” the trendline.
6. Which of the following is **true** with respect to bond price theorems?
- If the YTM is greater than the coupon rate, the market price of the bond will be equal to the par value of the bond
 - If YTM increases above the coupon rate, the market value will be more than the face value
 - If the YTM equals its coupon rate, the market price of the bond will be equal to the par value of the bond
 - For a given difference between YTM and coupon rate of the bonds, the longer the term to maturity, the lower will be the change in the price with change in YTM
 - Given the maturity, the change in bond price will be greater with an increase in the bond's YTM than the change in bond's price with an equal decrease in the bond's YTM.
7. Which of the following statement(s) is/are **true** of growth industries?
- They are considered to be most likely to benefit from a period of economic prosperity and most likely to suffer from a period of economic slowdown
 - They are hurt least in periods of economic slowdown
 - During economic slowdown their earnings might very well expand while the earnings of other industries decline
 - They are generally characterized by expectation of abnormal returns, often independent of business cycle
- Only (I) above
 - Only (II) above
 - Only (III) above
 - Only (IV) above
 - Both (III) and (IV) of above.
8. Which of the following is **true** regarding the weak form of efficient market?
- All historical and publicly available information will be instantly discounted by the market
 - All the insider information will be discounted by the market instantly
 - All historical information relating to share prices will be discounted by the market
 - Technical analysis will yield abnormal returns
 - It is impossible to earn abnormal returns.
9. Which of the following is/are **not** diversifiable risk?
- Sector risk
 - Credit risk
 - Market risk
 - Management risk.
- Only (II) above
 - Only (III) above
 - Both (I) and (IV) above
 - Both (I) and (II) above
 - (I), (II) and (III) above.

10. The required rate of return of a company is 20%. It has paid a dividend of Rs.2.50 for the year 2000-2001, if the stock is currently trading at its intrinsic value of Rs.40, the growth rate in dividend is
- 17.28%
 - 13.46%
 - 12.94%
 - 11.06%
 - 10.89%

11. The closing prices of security A are as follows:

Year	Closing price (Rs.)
0	10.00
1	12.00
2	15.00

The time adjusted annual rate of return for the two years period is _____ %.

- 50.0%
 - 36.5%
 - 28.8%
 - 25.0%
 - 22.5%
12. The return and risk of market and stock of Fouress Valves Ltd. is as follows:

	Return	Standard deviation	$\rho_{i,m}$
Fouress Valves Ltd.	12%	10%	0.48
Market	8%	8%	

The beta of stock of Fouress Valves is

- 0.38
 - 0.48
 - 0.60
 - 0.72
 - 1.36
13. Conversion premium of a convertible security is
- $\frac{\text{Conversion value} - \text{Market price}}{\text{Market price}}$
 - $\frac{\text{Market price} - \text{Price of similar but non - convertible security}}{\text{Market price}}$
 - $\frac{\text{Market price} - \text{Conversion value}}{\text{Conversion value}}$
 - $\frac{\text{Conversion value} - \text{Price of similar but non - convertible security}}{\text{Conversion value}}$
 - $\frac{\text{Bond price} - \text{Investment value}}{\text{Investment value}}$
14. Which of the following is **not** a method for analyzing market breadth?
- Stocks in positive trend
 - Percentage of stocks over a moving average
 - Diffusion index
 - High-low statistics
 - Relative strength index.

15. Which of the following is **not** a basic assumption underlying technical analysis?
- Supply and demand are governed by only rational factors
 - Market value is determined solely by the demand and supply
 - Chart patterns tends to repeat themselves
 - Changes in trends are caused by shifts in supply and demand
 - Stock prices tend to move in trends which persist for an appreciable length of time.
16. Which of the following is **not** an assumption underlying the computation of YTM of a bond?
- All coupon and principal payments are made on schedule
 - The bond is held to maturity
 - The coupon payments are fully and immediately reinvested at the prevailing market rate
 - The coupon payments are fully and immediately reinvested at precisely the same interest rate as the promised YTM.
 - None of the above.
17. Which of the following is a test for semi-strong form of market efficiency?
- Simulation tests
 - Serial-correlation tests
 - Run tests
 - Filter tests
 - Residual analysis tests.
18. Which of the following statements is/are **true**?
- The slope of SML is beta
 - The slope of characteristic line is $(R_m - R_f)$
 - The slope of SML is $(R_m - R_f)$
 - The characteristic line is used to evaluate performance of individual security
 - Both (b) and (c) above.
19. The correlation coefficient of return on stock X with market return is negative. Which of the following is the implication of the given statement?
- On an average the returns from stock and market move in opposite directions
 - The average risk of stock X is less than the market risk
 - The average return of stock X is more than the market return
 - Stock X has given an above normal return
 - Stock X has given a below normal return.

20. An abridged balance sheet and P&L statement for ABC Co. is as follows:

P&L (Rs. in lakhs)		Balance sheet (Rs. in lakhs)			
Sales	8,000	Liabilities		Assets	
Cost of sales	6,000	Equity	300	Fixed assets	600
Depreciation	200	Reserves	400	Current assets	400
PBT	1,800	Current Liabilities	300		
Tax	540				
PAT	1,260		1000		1000

The total assets turnover ratio is

- 7
- 8
- 10
- 11
- 12

21. The ex-post SML for a pharmaceutical company is given by the equation

$$R_i(\%) = 8 + \beta_i 7$$

For a security with a beta of 1.3 and actual return of 24%, the security's ex-post alpha (α) is

- a. -3.2%
 - b. +3.2%
 - c. +4.0%
 - d. +4.8%
 - e. +6.9%
22. The correlation coefficient between the market return and return on security X is 0.25. The market return for the year 2000-01 was 7% and the return on security X was 11%. The percentage variance of return of X that is explained by variance in the market return is
- a. 6.25%
 - b. 12.50%
 - c. 25.00%
 - d. 30.00%
 - e. 40.00%
23. The main difference(s) between a futures and a forward contract is/are
- I. Unlike futures, forward contract is standardized in terms of quality, quantity and terms of delivery
 - II. Unlike futures, forward contracts are traded in an organized exchange
 - III. Unlike forwards, futures is an over the counter contract
 - IV. Unlike forwards, futures contract is standardized in terms of quantity, quality and terms of delivery.
- a. Only (I) above
 - b. Only (II) above
 - c. Only (III) above
 - d. Only (IV) above
 - e. Both (III) and (IV) above.
24. Which of the following statements is **true** with respect to a moving average (MA)?
- a. When the MA rises above the price line, a reversal in bearish trend is signaled
 - b. If the MA is flat or has already begun to change direction, a crossover by the price line is not a reliable indicator
 - c. The significance of a crossover signal depends to a large extent, on the time span covered by the MA
 - d. A moving average represents a smoothened trend and therefore, cannot act as support/resistance level
 - e. A moving average covering a longer time span is actually smoothening a long term trend, and its crossover is hence less significant than a crossover of an average of a shorter time span.
25. Which of the following is a property of duration?
- a. The duration of a perpetual bond is equal to $r/(1+r)$, where 'r' is the YTM of the bond
 - b. The limiting value for duration of bond is $(1+r)/r$, where 'r' is the coupon rate of the bond
 - c. The longer is term to maturity of a coupon paying bond, the lower is the difference between its term to maturity and duration
 - d. The larger is the coupon rate, the larger is the duration of the bond, other things remaining constant.
 - e. The limiting value for duration of bonds is $(1+r)/r$, where 'r' is the YTM of the bond.

26. Which of the following statements is **true** of industry life cycle?
- a. In the pioneering stage few companies continue to get stronger, both in share of the market and financially
 - b. In the stabilization stage, many firms are lured into the industry as a result of profit opportunities
 - c. The pioneering stage is typified by rapid growth in demand for the output of the industry
 - d. In the expansion stage, as a large number of firms attempt to capture their share of the market, there arises a high business mortality rate
 - e. The stabilization phase is typified by reduction in competition between firms.
27. Mr. Anil Handa an employee of XYZ Co. was not able to earn profit from the information he had about the likely profit figure for the company, even after trying for an extended period of time. This means that the market is exhibiting
- a. Weak form of market efficiency
 - b. Semistrong form of market efficiency
 - c. Super strong form of market efficiency
 - d. Near strong form of market efficiency
 - e. Inefficiency
28. Which of the following is a lag indicator?
- a. Utilization of manufacturing capacity
 - b. Change in price of sensitive materials
 - c. Residential construction
 - d. Corporate profits
 - e. None of the above.
29. Which of the following is **not** an application of SML?
- a. Evaluating the performance of portfolio manager
 - b. Tests of asset pricing theories
 - c. Tests of market efficiency
 - d. Identifying mispriced securities
 - e. Identifying the factors of pricing of an asset.
30. The duration for a bond paying semi-annual coupon is 6.78 years for a maturity of 11 years. If the YTM of the bond is 13% with a coupon rate of 12% and face value is Rs.100, the modified duration of the bond is
- a. 6.37 years
 - b. 6.28 years
 - c. 6.14 years
 - d. 5.82 years
 - e. 4.86 years.

END OF PART A

Part B : Problems (50 Points)

- This part consists of questions with serial number 1 - 5
- Answer **all** questions.
- Points are indicated against each question.
- Detailed workings should form part of your answer.
- Do not spend more than 110 - 120 minutes on Part B.

1. Based on the credit rating of the bonds Mr. Alok has decided to apply the following discount rates for valuing bonds:

Credit rating	Discount rate
AAA	364-day T-bill rate + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in a AA rated, Rs.1000 face value bond currently selling at Rs.1025.86. The bond has five years to maturity and the coupon rate on the bond is 15% p.a. payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume the 364-day T-bill rate to be 9%).

You are **required** to

- Calculate the intrinsic value of the bond for Mr. Alok. Should he invest in the bond?
- Calculate the current yield (CY) and the yield to maturity (YTM) of the bond.

(6 + 5 = 11 points)

2. Aksh Optima, is a company operating in a mature industry. Presently, its EPS is Rs.6.75. Aksh's dividend payout ratio is 60% and ROE is 10% and both of these are expected to be the same in the near future. The beta of the company is 0.86. The treasury bill rate is 9.86% and the average return from the market is 15.26%.

You are **required** to

- Calculate the intrinsic value of Aksh Optima shares using Dividend Discount Model (DDM).
- Calculate the intrinsic value of Aksh Optima shares using DDM while considering that the company acquires another company and as a result dividends grow at 20% for the next three years and return to the constant historical growth rate from 4th year.

(5 + 5 = 10 points)

3. Mr. Mallik, feels that Indian stock markets recently has exhibited weak form of market efficiency. In order to test the validity of his impression, he collected some data relating to movement of sensx for the last 20 trading days which is as follows :

(Rs.)

Days	Open	High	Low	Close
1	3470.94	3513.79	3438.03	3453.99
2	3453.63	3478.11	3427.82	3434.83
3	3414.06	3440.29	3397.65	3431.93
4	3434.94	3446.18	3377.58	3383.41
5	3372.92	3380.27	3352.12	3370.93
6	3375.82	3389.49	3331.42	3340.75
7	3340.89	3340.89	3310.95	3330.98
8	3326.84	3340.91	3306.17	3335.08
9	3307.16	3338.22	3296.43	3301.97
10	3298.64	3318.60	3254.28	3259.03
11	3260.04	3278.85	3241.66	3251.53
12	3255.92	3289.46	3249.46	3285.89
13	3288.86	3535.67	3255.98	3329.28
14	3335.00	3346.21	3276.72	3284.17
15	3293.83	3310.86	3278.54	3298.78
16	3300.02	3337.79	3300.02	3325.38
17	3323.36	3356.34	3322.44	3329.95
18	3322.81	3345.98	3317.44	3319.67
19	3317.51	3321.18	3294.19	3302.32
20	3290.86	3324.96	3279.62	3319.61

You are **required** to test the weak form of efficient market hypothesis using the autocorrelation test, taking a time lag of 10 days.

(10 points)

4. Consider the following daily stock prices of a FMCG company on NSE:

(Rs.)

Trading Day	High	Low	Close
1	3700	3300	3430
2	3900	3450	3450
3	3850	3475	3480
4	3925	3375	3395
5	3830	3420	3550
6	3635	3390	3575
7	3575	3350	3570
8	3530	3320	3430
9	3510	3340	3400
10	3490	3310	3380

You are **required** to

- Calculate %K stochastics for 5 day periods where $\%K = \frac{C-L}{H-L} \times 100$ and the notations are used in their standard form.
- Calculate %D stochastics for 3-day simple moving average of %K stochastics.
- Interpret result obtained in (a) and (b) above.

(4 + 1 + 3 = 8 points)

5. Mr. Anup Singhal has identified the shares of two companies that have good investment potential. The following is the share price data relating to them:

Year	XYZ Co.(Rs./share)	ABC Co. (Rs./share)
1995	19.60	8.70
1996	18.75	12.80
1997	33.42	16.20
1998	42.64	18.25
1999	43.25	15.60
2000	44.60	13.25
2001	34.75	18.60

You are **required** to

- Calculate the return and risk from investing in XYZ Co. and ABC Co.
- Calculate the return and risk from investing in a portfolio of the two stocks, if he invests 60% in ABC and 40% in XYZ.
- State whether it is better for him to invest in the combination mentioned in (b) above than in any one of the companies? Give reasons.

(5 + 5 + 1 = 11 points)

END OF PART B

Part C : Applied Theory (20 Points)

- This part consists of questions with serial number 6 - 7.
- Answer **all** questions.
- Points are indicated against each question.
- Do not spend more than 25 -30 minutes on Part C.

6. In India, trading in derivative products is picking up. Educating brokers and lay investors will help the development of strong market for these products. In this context, discuss
- The different types of traders on exchanges where options are traded.
 - The types of positions in an option trade.

(5 + 5 = 10 points)

7. Appraising the value of real assets is always challenging because of the subjectivity in valuation, absence of periodical income as well as non-availability of the assets in standard forms. Discuss the various approaches used to estimate the market value of real assets.

(10points)

END OF PART C

END OF QUESTION PAPER

Suggested Answers

Security Analysis – I : October 2001

Part A : Basic Concepts

1. Answer : (a)
Reason : $r = \frac{2 + (12 \times 10 - 90)}{90} = \frac{32}{90} = 0.3555$ i.e. 35.56%.
2. Answer : (e)
Reason : Number of unique covariance terms = $\frac{n(n-1)}{2} = \frac{11 \times 10}{2} = 55$.
3. Answer : (e)
Reason : Statement II relates to Bond of Investment method. Statement III relates to Built-up method.
4. Answer : (d)
Reason : As a call option is a right to buy without an obligation to do so. Whereas a put option is a right to sell without an obligation to do so.
5. Answer : (c)
Reason :
 - a. is not correct as more than number of peaks and trough that touch a trend line greater its significance.
 - b. is not correct as it is not breadth but the length of the trend line which indicates whether a penetration is significant or not.
 - d. is not correct as penetration of steep trend line results in a corrective movement after which the previous trend continues.
 - e. is not correct as the peaks of rallies when penetrate the trend line that indicates shift in trend.
6. Answer : (c)
Reason : Alternative (a) and (b) are not correct as at $YTM > \text{Coupon rate}$ price of bond will be less than its par value.

Alternative (d) is not correct as price change is increases with the increase in term to maturity.

Alternative (e) is not correct as change in bond's price is smaller with an increase in YTM than the change in bond's price with an equal decrease in the bond's YTM.
7. Answer : (d)
Reason : The growth industries provide above normal returns independent of business cycle.
8. Answer : (c)
Reason :
 - a. is not correct as market efficiency in the weak form is not considering the publicly held information discounting by market.
 - b. is not correct as privately held information is discounted by market in the strong form of efficiency.
 - d. is not correct as weak form of efficiency supports random walk model where technical analysis is not of any help.
 - e. is not correct as a person can earn abnormal return by fundamental analysis and insider trading.
9. Answer : (b)
Reason : All risks i.e. sector risk, credit risk, management risk are diversifiable i.e. can be diversified away by holding of stocks of more than one company. However, market risk cannot be diversified away.

10. Answer : (c)

$$\text{Reason : } P_0 = \frac{D_0(1+g)}{h-g} \Rightarrow 40 = \frac{2.5(1+g)}{0.2-g} \Rightarrow 8 - 40g = 2.5 + 2.5g \\ \Rightarrow 42.5g = 5.5 \Rightarrow g = 0.1294 \text{ i.e. } 12.94\%.$$

11. Answer : (e)

$$\text{Reason : } 10(1+r)^2 = 15 \Rightarrow r = (1.5)^{1/2} - 1 = 0.2247 \text{ i.e. } 22.5\%$$

12. Answer : (c)

$$\text{Reason : } \beta = \rho_{i,m} \frac{\sigma_i}{\sigma_m} = 0.48 \times \frac{10}{8} = 0.6$$

13. Answer : (c)

Reason : As conversion premium is calculated at the base of conversion value.

14. Answer : (e)

Reason : The extent of trend is monitored by breadth. All of the alternatives (a), (b), (c) and (d) are used for measuring market breadth.

Alternative (e) is used for measuring stock and market momentum.

15. Answer : (a)

Reason : All of the alternatives (b), (c), (d) and (e) are the assumptions underlying technical analysis. In fact, under the basic assumption underlying technical analysis supply and demand are assumed to be governed by both rational and irrational factors.

16. Answer : (c)

Reason : Alternatives (a), (b) and (d) are the assumptions of YTM. Alternative (c) is not an assumption as the coupon payments are fully and immediately reinvested at the promised YTM.

17. Answer : (e)

Reason : Alternative (a) is not used for testing of market efficiency. Alternatives (b), (c), (d) are the test for weak form of market efficiency.

Alternative (e) is used for testing semi strong form of efficiency.

18. Answer : (c)

Reason : a. is not correct as slope of SML is $(R_m - R_f)$
b. is not correct as slope of characteristic line is β
d. is not correct as it is SML which is used to evaluate the performance of individual security.

19. Answer : (a)

Reason : Negative correlation between a stock and market implies that when the market gives positive return the stock will give negative return.

20. Answer : (b)

$$\text{Reason : Total Asset Turnover} = \frac{\text{Sales}}{\text{TA}} = \frac{8000}{1000} = 8$$

21. Answer : (e)

$$\text{Reason : } \alpha = \text{Actual Return} - \text{Required return by SML} \\ = 24 - 8 + 1.3 \times 7 = 6.9\%$$

22. Answer : (a)

$$\text{Reason : \% Variance explained by market} \\ = \rho_{i,m}^2 \times 100 = (0.25)^2 \times 100 = 6.25\%$$

23. Answer : (e)

Reason : Forwards are tailor made contracts which is used for hedging purposes. Futures are standardized contracts in terms of quality, quantity and terms of delivery. Normally futures are squared off by reverse transactions and does not necessarily end with delivery.

24. Answer : (c)
Reason : a) is not correct as when MA rises above the price line, a reversal in bullish trend is signaled.
b) is not correct as if the MA is flat or has already begun to change direction, a crossover by price like is a fairly reliable indicator.
d) is not correct as a MA represents a smoothened trend and therefore such as support / resistance level.
e) is not correct as the significance of a crossover signal depends, to a large extent, on a time span covered by a MA line.
25. Answer : (e)
Reason : Alternatives a) and b) are not correct as limiting value of a perpetual bond is given by $(1 + r) / r$ where 'r' is ytm of the bond.
Alternative c is not correct as for a coupon paying bond longer the term to maturity larger is the difference between its term to maturity and duration.
26. Answer : (c)
Reason : a) is not correct in as pioneering stage not few but many firms are level into industry as a result of profit opportunity.
b) is not correct as in stabilization stage few companies continue to get stronger, both in share in share of market and financially.
d) is not correct as it is not the expansion stage but the pioneering stage where a large number of firms attempt to capture their share of the market, there arises a high business mortality rate.
e) is not correct as stabilization phase is typified by increase competition between firms.
27. Answer : (c)
Reason : Alternative a) and b) are not correct as only historical and publicly held information are discounted by them respectively.
Alternative d) is not correct as in the near strong form the analysis made by analysts and the experts e.g. mutual funds in the field is discounted by the market.
In only super strong form of market efficiency the insider information is discounted by the market.
28. Answer : (e)
Reason : All the alternative a), b), c) and d) are lead indicators as they turn ahead of the change in general level of economic activity.
29. Answer : (e)
Reason : Alternatives a), b) and c) are applications of ex-post SML. Whereas alternative d) is an application of ex-ante SML. Alternative e) is not an application of SML.
30. Answer : (a)
Reason : Modified duration = $\frac{D}{1 + \frac{YTM}{p}}$ Where p is frequency of coupon payment.
$$= \frac{6.78}{1 + \frac{0.13}{2}} = 6.366 \text{ i.e. } 6.37 \text{ years.}$$

Part B : Problems

1. a. The appropriate discount rate for valuing the bond for Mr. Alok is

$$R = 9 + 3 + 2 = 14\%$$

Time	CF	PVIF@14%	PV(CF)
1	150	0.877	131.55
2	150	0.769	115.35
3	150	0.675	101.25
4	150	0.592	88.80
5	1150	0.519	596.85
			$\Sigma PV(CF)$ i.e. $P_o = 1033.80$

Since, the current market value is less than the intrinsic value, Mr. Alok should buy the bond.

b. Current yield = $\frac{\text{Coupon}}{\text{MP}} = \frac{150}{1025.86} = 14.62\%$

The YTM of the bond is calculated as follows:

@ 15%

$$\begin{aligned} P &= 150 \times PVIFA_{15\%, 4} + 1150 \times PVIF_{15\%, 5} \\ &= 150 \times 2.855 + 1150 \times 0.497 \\ &= 428.25 + 571.55 = 999.80 \end{aligned}$$

@ 14%

As found in sub part (a) $P_o = 1033.80$

By interpolation

$$\begin{aligned} \text{YTM} &= 14 + (15 - 14) \times \frac{1033.80 - 1025.86}{1033.80 - 999.80} \\ &= 14.23\% \end{aligned}$$

2. Required rate of return for Aksh optima

$$\begin{aligned} &= R_f + \beta_i (R_m - R_f) \\ &= 9.86 + 0.86 (15.26 - 9.86) \\ &= 9.86 + 4.64 = 14.5\% \end{aligned}$$

a. $V_o = \frac{D_o(1+g)}{K_e - g}$

$$g = \text{RoE} (1 - d) = 0.1 (1 - 0.60)$$

(where **d** is the dividend payout ratio)

$$= 0.1 (0.4)$$

$$= 0.04 \Rightarrow 4\%$$

$$D_o = 6.75 \times 0.6 = 4.05$$

$$V_o = \frac{4.05(1.04)}{0.145 - 0.04} = \frac{4.212}{0.105} = \text{Rs.}40.11$$

b. $D_o = 4.05$

Year	Div	PV@14.5%	PV(Div)
1	$4.05 \times 1.2 = 4.86$	0.873	4.24
2	$4.86 \times 1.2 = 5.83$	0.763	4.45
3	$5.83 \times 1.2 = 7.00$	0.666	4.66
			13.35

$$P_3 = \frac{7.00(1.04)}{0.145 - 0.04} = \frac{7.28}{0.105} = 69.33$$

$$\begin{aligned}
\text{Present value of } P_3 &= 69.33 \times \text{PVIF}_{14.5, 3} \\
&= 69.33 \times 0.666 \\
&= 46.17 \\
\text{Intrinsic value} &= 46.17 + 13.35 = \text{Rs.}59.52.
\end{aligned}$$

3.

Period I	Sensex closing	Change (X)	Period II	Sensex closing	Change (Y)
1	3453.99	–	11	3251.53	–
2	3434.83	–19.16	12	3285.89	34.36
3	3431.93	–2.90	13	3329.28	43.39
4	3383.41	–48.52	14	3284.17	–45.11
5	3370.93	–12.48	15	3298.78	14.61
6	3340.75	–30.18	16	3325.38	26.60
7	3330.98	–9.77	17	3329.95	4.57
8	3335.08	4.10	18	3319.67	–10.28
9	3301.97	–33.11	19	3302.32	–17.35
10	3259.03	–42.94	20	3319.61	17.29

X	Y	X ²	Y ²	XY
–19.16	34.36	367.11	1180.61	–658.34
–2.90	43.39	8.41	1882.69	–125.83
–48.52	–45.11	2354.19	2034.91	2188.74
–12.48	14.61	155.75	213.45	–182.33
–30.18	26.60	910.83	707.56	–802.79
–9.77	4.57	95.45	20.88	–44.65
4.10	–10.28	16.81	105.68	–42.15
–33.11	–17.35	1096.27	301.02	574.46
–42.94	17.29	1843.84	298.94	–742.43
$\Sigma X = -194.96$	$\Sigma Y = 68.08$	$\Sigma X^2 = 6848.66$	$\Sigma Y^2 = 6745.74$	$\Sigma XY = 164.68$

$$\bar{X} = -21.66 \quad (\bar{X})^2 = 469.16$$

$$\bar{Y} = 7.56 \quad (\bar{Y})^2 = 57.15$$

$$r^2 = \frac{a\Sigma Y + b\Sigma XY - n\bar{Y}^2}{\Sigma Y^2 - n\bar{Y}^2}$$

$$a = \bar{Y} - b\bar{X}$$

$$b = \frac{\Sigma XY - n\bar{X}\bar{Y}}{\Sigma X^2 - n(\bar{X})^2}$$

$$b = \frac{164.68 - 9(-21.66 \times 7.56)}{6848.66 - (9 \times 469.16)} = \frac{164.68 + 1473.75}{6848.66 - 4222.44} = \frac{1638.43}{2626.22} = 0.624$$

$$a = 7.56 - 0.624 \times (-21.66) = 21.07$$

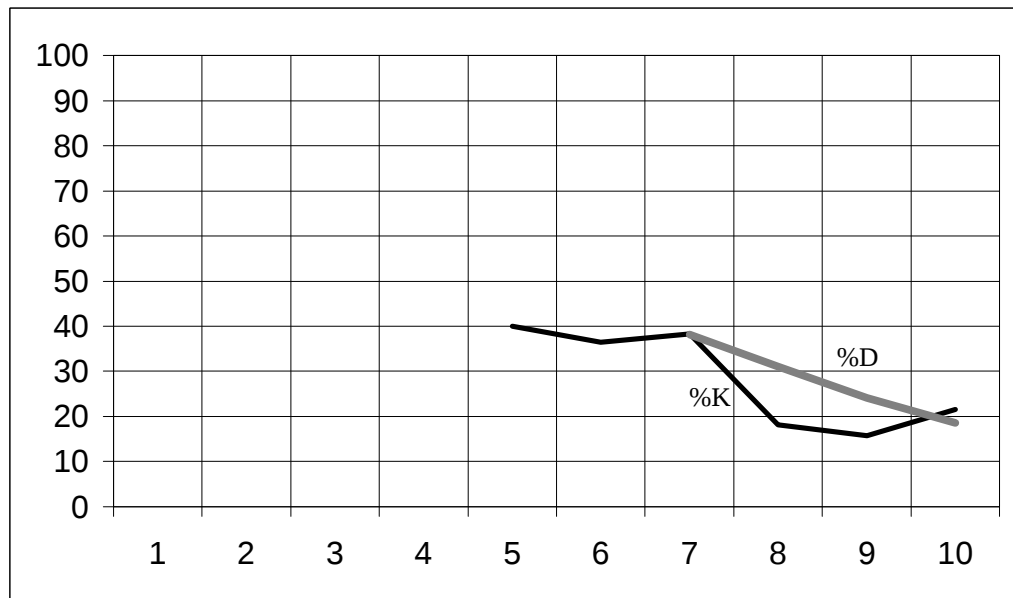
$$r^2 = \frac{(21.07 \times 68.08) + (0.624 \times 164.08) - (9 \times 57.15)}{6745.74 - 9(57.15)} = 0.1641$$

$$r = \sqrt{0.1641} = 0.405$$

Hence, there is moderate degree of correlation between the returns of two periods and we can conclude the market does not exhibit weak form of efficiency.

4. a. & b.

Day	High	Low	Close	(C – L5)	(H5 – L5)	%K	%D
1	3700	3300	3430				
2	3900	3450	3450				
3	3850	3475	3480				
4	3925	3375	3395				
5	3830	3420	3550	(3550 – 3300)	(3925 – 3300)	40.0	
6	3635	3390	3575	(3575 – 3375)	(3925 – 3375)	36.4	
7	3575	3350	3570	(3570 – 3350)	(3925 – 3350)	38.3	38.2
8	3530	3320	3430	(3430 – 3320)	(3925 – 3320)	18.2	31.0
9	3510	3340	3400	(3400 – 3320)	(3830 – 3320)	15.7	24.1
10	3490	3310	3380	(3380 – 3310)	(3635 – 3310)	21.5	18.5



- c. As the formula itself indicates, %K line is a fast moving line and generates faster signals than the %D line. But %D line is more important line as it gives buy and sell signals. As %K and %D are below 30 hence these are in oversold position.

As %K move above the %D line therefore, it is a buy signal at the end of 10th trading day.

5. a.

Year	Return on XYZ(%)	Return on ABC(%)
1995	–	–
1996	–4.34	47.13
1997	78.24	26.56
1998	27.59	12.65
1999	1.43	–14.52
2000	3.12	–15.06
2001	–22.09	40.38
	$\Sigma R_{XYZ} = 83.95$	$\Sigma R_{ABC} = 97.14$

Average Return XYZ = 13.99%

Average Return ABC = 16.19%

Risk of XYZ

R_i	$R_i - \bar{R}_{XYZ}$	$(R_i - \bar{R}_{XYZ})^2$
-4.34	-18.33	335.99
78.24	64.25	4128.06
27.59	13.60	184.96
1.43	-12.56	157.75
3.12	-10.87	118.16
-22.09	-36.08	1301.77
		6226.69

$$\sigma^2 = \frac{6226.69}{5} = 1245.34(\%)^2$$

$$\sigma_i = 35.29\%$$

Risk of ABC

R_i	$R_i - \bar{R}_{ABC}$	$(R_i - \bar{R}_{ABC})^2$
47.13	30.94	957.28
26.56	10.37	107.54
12.65	-3.54	12.53
-14.52	-30.71	943.10
-15.06	-31.25	976.56
40.38	24.19	585.16
		3582.17

$$\sigma^2 = \frac{3582.17}{5} = 716.43(\%)^2$$

$$\sigma_i = 26.77\%$$

b. Covariance between XYZ and ABC

$(XYZ - \bar{XYZ})$ (1)	$(ABC - \bar{ABC})$ (2)	$(1) \times (2)$
-18.33	30.94	-567.13
64.25	10.37	667.27
13.60	-3.54	-48.14
-12.56	-30.71	+385.72
-10.87	-31.25	339.69
-36.08	24.19	-872.78
		-95.37

$$\text{Cov} = \frac{-95.37}{5} = -19.07(\%)^2$$

i. Return on portfolio, $R_p = 0.6 \times R_{ABC} + 0.4 \times R_{XYZ}$

$$\begin{aligned} R_p &= 0.6 (16.19) + 0.4 (13.99) \\ &= 9.71 + 5.60 = 15.31\% \end{aligned}$$

$$\begin{aligned}
\text{ii. Variance of portfolio, } \sigma_p^2 &= W_{ABC}^2 \sigma_{ABC}^2 + W_{XYZ}^2 \sigma_{XYZ}^2 + 2 \times W_{ABC} \times W_{XYZ} \times \text{Cov}(ABC, XYZ) \\
\sigma_p^2 &= (0.6)^2 (716.43) + (0.4)^2 (1245.34) + 2 \times 0.6 \times 0.4 (-19.07) \\
&= 257.91 + 199.25 + (-9.15) \\
\sigma_p^2 &= 448.01 (\%)^2 \\
\sigma_p &= 21.17\%
\end{aligned}$$

c. Above computations are summarized below:

	Stock ABC	Stock XYZ	Portfolio of stocks ABC & XYZ in given proportions
Return (R) %	16.19	13.99	15.31
Standard Deviation (σ) %	26.77	35.29	21.27
Return per unit risk (R/ σ)	0.605	0.396	0.720

As return over risk is maximum for portfolio we shall invest in the portfolio rather than the individual stocks.

Part C: Applied Theory

6. a. TYPES OF TRADERS

As in stock exchanges, we find different kinds of traders on the floor of the exchange where options are traded. They are market makers, floor brokers and order book officials and specialists.

i. Market Makers

A trader who trades on his own account in order to make a profit is a market maker. Market makers have an obligation to make market for the investors by standing ready to buy and sell options. Market makers can follow different strategies in the options of the few stocks which he deals in by gauging the mood of the investing public.

ii. Floor Brokers

The floor broker's main job is to execute the order which he receives from outside the exchange at the best possible price quickly. They usually belong to one of the brokerage firms and receive salary or commissions. The brokerage firms also engage in proprietary trading i.e. trading for their own account. Other staff members assist them.

iii. Order Book Officials

The order book official is an employee of the exchange who participates in trading. He cannot trade for his own account. His main task is to facilitate the flow of orders. This he does by disclosing the best possible limit orders awaiting execution. He is assisted by other staff members.

iv. Specialists

These officials function as both dealers and brokers. As dealers, they have to maintain inventory of the stocks they are assigned and deal in them by quoting the prices in both ways. As brokers, they have the responsibility of maintaining the limit order book and execute orders in it keeping in view the movement in the market prices.

Specialists are employed by the American Stock Exchange, but in Chicago Board Options Exchange, the function of the specialists is divided between market makers and order book officials.

b. **TYPES OF POSITIONS**

Options trade fall into one of the four categories:

i. **Open a position with a purchase**

An investor opens a position or establish a position by buying an option. This action on the part of the investor increases the existing long positions by a single contract. An investor is said to be long when he buys an options' contract – it being either a call option or a put option.

ii. **Open a position with a sale**

An investor can also open or establish a position by writing an option. This increases the existing short positions by a single option. An investor is said to be short when he writes an option, whether it is a call or a put option.

iii. **Close a position with a purchase**

An investor who has a short position as a result of writing an option can cancel it by entering into a closing purchase transaction. This reduces the existing short positions by one contract.

iv. **Close a position with a sale**

An investor who has a long position as a result of buying an option can offset it by entering into a closing sale transaction. This reduces the existing long positions by one contract.

When a trader closes an existing position – either long or short, that order is called as an offsetting order. Thus, an investor who is long cancels his position by a sale of an option which belongs to the same series (this is a necessary condition) and an investor who is short can cancel his position by purchasing an option belonging to the same series.

7. The appropriate method to calculate the market value depends upon the way the property is acquired.

Alternative	Method
1. Buy an existing one	Market or Direct Sales Comparison approach
2. Buy a clear site and develop it	Cost approach
3. Buy a property with same Risk Return characteristics	Income approach

Here we discuss briefly the steps involved in the three approaches stated above.

I. **Market or Direct Sales Comparison Approach**

The steps involved in this method are:

1. Select properties which have similar characteristics to that of the subject property.
2. Then subdivide them into units so that it would aid us in comparing and performing calculations.
3. Then adjust the sales figures with that of the subject property and
4. Estimate the market value of the subject property.

II. **Income Approach**

Here, we have two methods. They are

a. **Gross Income Multiplier method and**

The steps involved in this method are:

1. Ascertaining the gross market earnings of the subject.
2. Calculating the gross income multiplier and
3. Estimating the value of the said property.

b. **Direct Income Capitalization method.**

The steps involved in this method are:

1. The calculation of the net operating income of the subject
2. Deriving the income capitalization rate from the market and
3. Estimating the market value of the subject.

Now, we look at the application part of this method.

Estimating of Market Value for Income Producing Property:

For a property which gives us regular returns, the market value is calculated in a similar way as we calculate net present value of cash flows from a financial asset. The formula is

$$MV_0 = \sum_{t=1}^n \frac{NOI_t}{(1+r)^t} + \frac{MV_n}{(1+r)^n}$$

Where

MV_0 is the current market price of the property

MV_n is the expected sales price of the property at time = n

NOI_t is the annual cash inflows or the net operating income at time = t, and

R is the required rate of return.

If we assume that this property changes hands infinite number of times, then the market value of the property is given by

$$MV_0 = \sum \frac{NOI_t}{(1+r)^t}$$

If the net operating income grows at a rate of “g” annually, then

$$MV_0 = \frac{NOI}{r-g} = \frac{NOI}{R_0}$$

Where NOI is the net operating income growing at a constant rate of “g”.

The term $(r - g)$ is the capitalization rate “ R_0 ”. When the rate of inflation is high, one would find a very low value of capitalization rate. Capitalization rates are net of appreciation or depreciation.

How to Derive The Capitalization Rate

To derive this rate, the following methods are employed. They are

1. Market Extraction Method

In this method we select comparable properties. For these properties’, we require net operating income and current market price. When the net operating income is divided by the sales price, we get the capitalization ratios. From these ratios, we choose a rate which reflects the market sentiment.

2. Band of Investment Method

In this method, the rates on equity as well as debt financing are weighted according to their proportions to calculate the capitalization rate.

3. Built-Up Method

In this method, the capitalization (Built-Up) rate is the sum of the following rates. They are

- i. Rate on an asset being non-liquid
- ii. The rate for risk
- iii. Pure interest or the risk-free rate and
- iv. Recapture premium (a return of investment).

III. Cost Approach

The steps involved in this are

1. Estimating the market value of the site
2. Estimating the improvisation or development charges
3. Estimation of depreciation charges and deducting them from development charges and
4. Estimating the market value of the property in question.